

SEQUENCE LISTING¹

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<120> MelanA-Peptide Analogue-Carrier-Conjugates

<130> PA058WO

<150> US 60/457,348
<151> 2003-03-26

<160> 94

<170> PatentIn version 3.2

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<213> Artificial sequence

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gacgatcgtc 10

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ggggacgatc gtcgggggg 19

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gggggacgat cgtcgggggg 20

<210> 4
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<223> oligonucleotide G5-6

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ggggggacga tcgtcggggg g 21

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<220>
<223> oligonucleotide G6-6

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<400> 5
 ggggggggacg atcgtcgggg gg 22

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<400> 6
 gggggggggac gatcgtcggg gggg 24

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<400> 7
 gggggggggga cgatcgtcgg gggggg 26

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<220>
 <223> oligonucleotide G9-9

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 ggggggggggg acgatcgtcg gggggggg 28

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<400> 9
 gggggggcgac gacgatcgtc gtcggggggg 30

<210> 10
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 10

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys

<210>	11
<211>	328
<212>	PRT
<213>	Bacteriophage Q-beta
<400>	11

Met 1	Ala	Lys	Leu 5	Glu	Thr	Val	Thr	Leu 10	Gly	Asn	Ile	Gly	Lys	Asp 15	Gly
Lys	Gln	Thr	Leu 20	Val	Leu	Asn	Pro	Arg 25	Gly	Val	Asn	Pro	Thr 30	Asn	Gly
Val	Ala	Ser 35	Leu	Ser	Gln	Ala	Gly 40	Ala	Val	Pro	Ala	Leu 45	Glu	Lys	Arg
Val	Thr 50	Val	Ser	Val	Ser	Gln 55	Pro	Ser	Arg	Asn	Arg 60	Lys	Asn	Tyr	Lys
Val 65	Gln	Val	Lys	Ile	Gln 70	Asn	Pro	Thr	Ala	Cys 75	Thr	Ala	Asn	Gly	Ser 80
Cys	Asp	Pro	Ser	Val 85	Thr	Arg	Gln	Ala	Tyr 90	Ala	Asp	Val	Thr	Phe 95	Ser
Phe	Thr	Gln	Tyr 100	Ser	Thr	Asp	Glu	Glu 105	Arg	Ala	Phe	Val	Arg 110	Thr	Glu
Leu	Ala	Ala 115	Leu	Leu	Ala	Ser	Pro 120	Leu	Leu	Ile	Asp	Ala 125	Ile	Asp	Gln
Leu	Asn 130	Pro	Ala	Tyr	Trp	Leu 135	Leu	Ile	Ala	Gly	Gly 140	Gly	Ser	Gly	Ser
Lys 145	Pro	Asp	Pro	Val	Ile 150	Pro	Asp	Pro	Pro	Ile 155	Asp	Pro	Pro	Pro	Gly 160
Thr	Gly	Lys	Tyr	Thr 165	Cys	Pro	Phe	Ala	Ile 170	Trp	Ser	Leu	Glu	Glu 175	Val
Tyr	Glu	Pro	Pro 180	Thr	Lys	Asn	Arg	Pro 185	Trp	Pro	Ile	Tyr	Asn 190	Ala	Val
Glu	Leu	Gln 195	Pro	Arg	Glu	Phe	Asp 200	Val	Ala	Leu	Lys	Asp 205	Leu	Leu	Gly

Asn Thr Lys Trp Arg Asp Trp Asp Ser Arg Leu Ser Tyr Thr Thr Phe
210 215 220

Arg Gly Cys Arg Gly Asn Gly Tyr Ile Asp Leu Asp Ala Thr Tyr Leu
225 230 235 240

Ala Thr Asp Gln Ala Met Arg Asp Gln Lys Tyr Asp Ile Arg Glu Gly
245 250 255

Lys Lys Pro Gly Ala Phe Gly Asn Ile Glu Arg Phe Ile Tyr Leu Lys
260 265 270

Ser Ile Asn Ala Tyr Cys Ser Leu Ser Asp Ile Ala Ala Tyr His Ala
275 280 285

Asp Gly Val Ile Val Gly Phe Trp Arg Asp Pro Ser Ser Gly Gly Ala
290 295 300

Ile Pro Phe Asp Phe Thr Lys Phe Asp Lys Thr Lys Cys Pro Ile Gln
305 310 315 320

Ala Val Ile Val Val Pro Arg Ala
325

<210> 12
<211> 362
<212> PRT
<213> BK virus

<400> 12

Met Ala Pro Thr Lys Arg Lys Gly Glu Cys Pro Gly Ala Ala Pro Lys
1 5 10 15

Lys Pro Lys Glu Pro Val Gln Val Pro Lys Leu Leu Ile Lys Gly Gly
20 25 30

Val Glu Val Leu Glu Val Lys Thr Gly Val Asp Ala Ile Thr Glu Val
35 40 45

Glu Cys Phe Leu Asn Pro Glu Met Gly Asp Pro Asp Asp Asn Leu Arg
50 55 60

Gly Tyr Ser Gln His Leu Ser Ala Glu Asn Ala Phe Glu Ser Asp Ser
65 70 75 80

Pro Asp Arg Lys Met Leu Pro Cys Tyr Ser Thr Ala Arg Ile Pro Leu
85 90 95

Pro Asn Leu Asn Glu Asp Leu Thr Cys Gly Asn Leu Leu Met Trp Glu
100 105 110

Ala Val Thr Val Lys Thr Glu Val Ile Gly Ile Thr Ser Met Leu Asn
115 120 125

Leu His Ala Gly Ser Gln Lys Val His Glu Asn Gly Gly Gly Lys Pro
130 135 140

5

Val Gln Gly Ser Asn Phe His Phe Phe Ala Val Gly Gly Asp Pro Leu
 145 150 155 160
 Glu Met Gln Gly Val Leu Met Asn Tyr Arg Thr Lys Tyr Pro Gln Gly
 165 170 175
 Thr Ile Thr Pro Lys Asn Pro Thr Ala Gln Ser Gln Val Met Asn Thr
 180 185 190
 Asp His Lys Ala Tyr Leu Asp Lys Asn Asn Ala Tyr Pro Val Glu Cys
 195 200 205
 Trp Ile Pro Asp Pro Ser Arg Asn Glu Asn Thr Arg Tyr Phe Gly Thr
 210 215 220
 Tyr Thr Gly Gly Glu Asn Val Pro Pro Val Leu His Val Thr Asn Thr
 225 230 235 240
 Ala Thr Thr Val Leu Leu Asp Glu Gln Gly Val Gly Pro Leu Cys Lys
 245 250 255
 Ala Asp Ser Leu Tyr Val Ser Ala Ala Asp Ile Cys Gly Leu Phe Thr
 260 265 270
 Asn Ser Ser Gly Thr Gln Gln Trp Arg Gly Leu Ala Arg Tyr Phe Lys
 275 280 285
 Ile Arg Leu Arg Lys Arg Ser Val Lys Asn Pro Tyr Pro Ile Ser Phe
 290 295 300
 Leu Leu Ser Asp Leu Ile Asn Arg Arg Thr Gln Lys Val Asp Gly Gln
 305 310 315 320
 Pro Met Tyr Gly Met Glu Ser Gln Val Glu Glu Val Arg Val Phe Asp
 325 330 335
 Gly Thr Glu Gln Leu Pro Gly Asp Pro Asp Met Ile Arg Tyr Ile Asp
 340 345 350
 Arg Gln Gly Gln Leu Gln Thr Lys Met Val
 355 360

<210> 13
 <211> 130
 <212> PRT
 <213> Bacteriophage fr

<400> 13

Met Ala Ser Asn Phe Glu Glu Phe Val Leu Val Asp Asn Gly Gly Thr
 1 5 10 15
 Gly Asp Val Lys Val Ala Pro Ser Asn Phe Ala Asn Gly Val Ala Glu
 20 25 30
 Trp Ile Ser Ser Asn Ser Arg Ser Gln Ala Tyr Lys Val Thr Cys Ser
 35 40 45

Val Arg Gln Ser Ser Ala Asn Asn Arg Lys Tyr⁶ Thr Val Lys Val Glu
 50 55 60

Val Pro Lys Val Ala Thr Gln Val Gln Gly Gly Val Glu Leu Pro Val
 65 70 75 80

Ala Ala Trp Arg Ser Tyr Met Asn Met Glu Leu Thr Ile Pro Val Phe
 85 90 95

Ala Thr Asn Asp Asp Cys Ala Leu Ile Val Lys Ala Leu Gln Gly Thr
 100 105 110

Phe Lys Thr Gly Asn Pro Ile Ala Thr Ala Ile Ala Ala Asn Ser Gly
 115 120 125

Ile Tyr
 130

<210> 14
 <211> 130
 <212> PRT
 <213> Bacteriophage GA

<400> 14

Met Ala Thr Leu Arg Ser Phe Val Leu Val Asp Asn Gly Gly Thr Gly
 1 5 10 15

Asn Val Thr Val Val Pro Val Ser Asn Ala Asn Gly Val Ala Glu Trp
 20 25 30

Leu Ser Asn Asn Ser Arg Ser Gln Ala Tyr Arg Val Thr Ala Ser Tyr
 35 40 45

Arg Ala Ser Gly Ala Asp Lys Arg Lys Tyr Ala Ile Lys Leu Glu Val
 50 55 60

Pro Lys Ile Val Thr Gln Val Val Asn Gly Val Glu Leu Pro Gly Ser
 65 70 75 80

Ala Trp Lys Ala Tyr Ala Ser Ile Asp Leu Thr Ile Pro Ile Phe Ala
 85 90 95

Ala Thr Asp Asp Val Thr Val Ile Ser Lys Ser Leu Ala Gly Leu Phe
 100 105 110

Lys Val Gly Asn Pro Ile Ala Glu Ala Ile Ser Ser Gln Ser Gly Phe
 115 120 125

Tyr Ala
 130

<210> 15
 <211> 594
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> HBcAg containing p33 from LCMV

7

<220>

<221> CDS

<222> (1)..(594)

<400> 15

atg	gac	att	gac	cct	tat	aaa	gaa	ttt	gga	gct	act	gtg	gag	tta	ctc	48
Met	Asp	Ile	Asp	Pro	Tyr	Lys	Glu	Phe	Gly	Ala	Thr	Val	Glu	Leu	Leu	
1				5					10					15		

tgc	ttt	ttg	cct	tct	gac	ttc	ttt	cct	tcc	gtc	aga	gat	ctc	cta	gac	96
Ser	Phe	Leu	Pro	Ser	Asp	Phe	Phe	Pro	Ser	Val	Arg	Asp	Leu	Leu	Asp	
			20					25					30			

acc	gcc	tca	gct	ctg	tat	cga	gaa	gcc	tta	gag	tct	cct	gag	cat	tgc	144
Thr	Ala	Ser	Ala	Leu	Tyr	Arg	Glu	Ala	Leu	Glu	Ser	Pro	Glu	His	Cys	
		35					40					45				

tca	cct	cac	cat	act	gca	ctc	agg	caa	gcc	att	ctc	tgc	tgg	ggg	gaa	192
Ser	Pro	His	His	Thr	Ala	Leu	Arg	Gln	Ala	Ile	Leu	Cys	Trp	Gly	Glu	
	50					55					60					

ttg	atg	act	cta	gct	acc	tgg	gtg	ggt	aat	aat	ttg	gaa	gat	cca	gca	240
Leu	Met	Thr	Leu	Ala	Thr	Trp	Val	Gly	Asn	Asn	Leu	Glu	Asp	Pro	Ala	
65					70				75						80	

tcc	agg	gat	cta	gta	gtc	aat	tat	gtt	aat	act	aac	atg	ggt	tta	aag	288
Ser	Arg	Asp	Leu	Val	Val	Asn	Tyr	Val	Asn	Thr	Asn	Met	Gly	Leu	Lys	
				85					90					95		

atc	agg	caa	cta	ttg	tgg	ttt	cat	ata	tct	tgc	ctt	act	ttt	gga	aga	336
Ile	Arg	Gln	Leu	Leu	Trp	Phe	His	Ile	Ser	Cys	Leu	Thr	Phe	Gly	Arg	
			100					105					110			

gag	act	gta	ctt	gaa	tat	ttg	gtc	tct	ttc	gga	gtg	tgg	att	cgc	act	384
Glu	Thr	Val	Leu	Glu	Tyr	Leu	Val	Ser	Phe	Gly	Val	Trp	Ile	Arg	Thr	
		115					120					125				

cct	cca	gcc	tat	aga	cca	cca	aat	gcc	cct	atc	tta	tca	aca	ctt	ccg	432
Pro	Pro	Ala	Tyr	Arg	Pro	Pro	Asn	Ala	Pro	Ile	Leu	Ser	Thr	Leu	Pro	
	130					135					140					

gaa	act	act	gtt	gtt	aga	cga	cgg	gac	cga	ggc	agg	tcc	cct	aga	aga	480
Glu	Thr	Thr	Val	Val	Arg	Arg	Arg	Asp	Arg	Gly	Arg	Ser	Pro	Arg	Arg	
145					150					155					160	

aga	act	ccc	tcg	cct	cgc	aga	cgc	aga	tct	caa	tcg	ccg	cgt	cgc	aga	528
Arg	Thr	Pro	Ser	Pro	Arg	Arg	Arg	Arg	Ser	Gln	Ser	Pro	Arg	Arg	Arg	
				165					170					175		

aga	tct	caa	tct	cgg	gaa	tct	caa	tgt	ctt	ctc	ctt	aaa	gct	gtt	tac	576
Arg	Ser	Gln	Ser	Arg	Glu	Ser	Gln	Cys	Leu	Leu	Leu	Lys	Ala	Val	Tyr	
			180					185					190			

aac	ttc	gct	acc	atg	taa											594
Asn	Phe	Ala	Thr	Met												
		195														

<210> 16

<211> 197

<212> PRT

<213> Artificial Sequence

<220>

<223> HBcAg containing p33 from LCMV

<400> 16

Met	Asp	Ile	Asp	Pro	Tyr	Lys	Glu	Phe	Gly	Ala	Thr	Val	Glu	Leu	Leu	
1				5					10					15		

Ser	Phe	Leu	Pro	Ser	Asp	Phe	Phe	Pro	Ser	Val	Arg	Asp	Leu	Leu	Asp	
			20					25					30			

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45 8
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60
 Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
 65 70 75 80
 Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys
 85 90 95
 Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110
 Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125
 Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140
 Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160
 Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175
 Arg Ser Gln Ser Arg Glu Ser Gln Cys Leu Leu Leu Lys Ala Val Tyr
 180 185 190
 Asn Phe Ala Thr Met
 195

<210> 17
 <211> 246
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> dsDNA fragment for packaging and stabilization of BKV

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 tacacatcca ttcacatggtg tgggtggag gttgacgccg ctgtcacccc agaggagcgc 120
 cacctgtcca agatgcagca gaacggctac gaaaatccaa cctacaagtt ctttgagcag 180
 atgcagaacg ctacgtatcc atacgatgtc cctgattacg cctaacgcga attcgccagc 240
 acagtg 246

<210> 18
 <211> 5
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> GGKGG Linker

<400> 18

Gly Gly Lys Gly Gly
 1 5

<210> 19
 <211> 128
 <212> PRT
 <213> Bacteriophage PP7

<400> 19

Met Ser Lys Thr Ile Val Leu Ser Val Gly Glu Ala Thr Arg Thr Leu
 1 5 10 15

Thr Glu Ile Gln Ser Thr Ala Asp Arg Gln Ile Phe Glu Glu Lys Val
 20 25 30

Gly Pro Leu Val Gly Arg Leu Arg Leu Thr Ala Ser Leu Arg Gln Asn
 35 40 45

Gly Ala Lys Thr Ala Tyr Arg Val Asn Leu Lys Leu Asp Gln Ala Asp
 50 55 60

Val Val Asp Cys Ser Thr Ser Val Cys Gly Glu Leu Pro Lys Val Arg
 65 70 75 80

Tyr Thr Gln Val Trp Ser His Asp Val Thr Ile Val Ala Asn Ser Thr
 85 90 95

Glu Ala Ser Arg Lys Ser Leu Tyr Asp Leu Thr Lys Ser Leu Val Ala
 100 105 110

Thr Ser Gln Val Glu Asp Leu Val Val Asn Leu Val Pro Leu Gly Arg
 115 120 125

<210> 20
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 20

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Arg Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125

Asn Pro Ala Tyr
 130

<210> 21
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta
 <400> 21

Ala Lys Leu Glu Thr Val Thr Leu Gly Lys Ile Gly Lys Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125

Asn Pro Ala Tyr
 130

<210> 22
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta
 <400> 22

Ala Arg Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Arg Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

11

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 23
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 23

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Arg
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 24
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 24

Ala Arg Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Arg
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala¹² Leu Glu Lys Arg Val
 35 40 45
 Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60
 Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80
 Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95
 Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110
 Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125
 Asn Pro Ala Tyr
 130

<210> 25
 <211> 184
 <212> PRT
 <213> Hepatitis B virus

<400> 25

Met Asp Ile Asp Pro Tyr Glu Phe Gly Ala Thr Val Glu Leu Leu Ser
 1 5 10 15
 Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr
 20 25 30
 Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser
 35 40 45
 Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu
 50 55 60
 Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala Ser
 65 70 75 80
 Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys Ile
 85 90 95
 Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu
 100 105 110
 Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro
 115 120 125
 Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu
 130 135 140
 Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg Arg
 145 150 155 160
 Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg

165 170 13 175
 ser Gln Ser Arg Glu Ser Gln Cys
 180
 <210> 26
 <211> 213
 <212> PRT
 <213> Hepatitis B virus
 <400> 26
 Met Gln Leu Phe His Leu Cys Leu Ile Ile Ser Cys Ser Cys Pro Thr
 1 5 10 15
 Val Gln Ala Ser Lys Leu Cys Leu Gly Trp Leu Trp Gly Met Asp Ile
 20 25 30
 Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu Ser Phe Leu
 35 40 45
 Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser
 50 55 60
 Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser Pro His
 65 70 75 80
 His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp Leu Met Asn
 85 90 95
 Leu Ala Thr Trp Val Gly Gly Asn Leu Glu Asp Pro Val Ser Arg Asp
 100 105 110
 Leu Val Val Gly Tyr Val Asn Thr Thr Val Gly Leu Lys Phe Arg Gln
 115 120 125
 Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val
 130 135 140
 Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala
 145 150 155 160
 Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr
 165 170 175
 Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro
 180 185 190
 Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser
 195 200 205
 Arg Glu Ser Gln Cys
 210

<210> 27
 <211> 188
 <212> PRT
 <213> Hepatitis B virus
 <400> 27

14

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
 1 5 10 15
 Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
 20 25 30
 Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
 35 40 45
 Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
 50 55 60
 Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln
 65 70 75 80
 Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
 85 90 95
 Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln
 100 105 110
 His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125
 Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140
 Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser
 145 150 155 160
 Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Ser Gln Ser Pro
 165 170 175
 Arg Arg Arg Arg Ser Gln Ser Pro Ser Thr Asn Cys
 180 185

<210> 28
 <211> 185
 <212> PRT
 <213> Hepatitis B virus

<400> 28

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15
 Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30
 Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60
 Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
 65 70 75 80

Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys
 85 90 15 95
 Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110
 Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125
 Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140
 Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160
 Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175
 Arg Ser Gln Ser Arg Glu Ser Gln Cys
 180 185

<210> 29
 <211> 152
 <212> PRT
 <213> Hepatitis B virus

<400> 29

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15
 Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30
 Thr Ala Ala Ala Leu Tyr Arg Asp Ala Leu Glu Ser Pro Glu His Cys
 35 40 45
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp
 50 55 60
 Leu Met Thr Leu Ala Thr Trp Val Gly Thr Asn Leu Glu Asp Gly Gly
 65 70 75 80
 Lys Gly Gly Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Val
 85 90 95
 Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr
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 Phe Gly Arg Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp
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17

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 35 40 45

18

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
50 55 60

Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
65 70 75 80

Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
85 90 95

Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
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Ala Gly Leu Gly Phe Leu Asp Pro Thr Ala Ala Ile Val Ser Ser Asp
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Thr Thr Ala
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20 25 30

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35 40 45

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
50 55 60

Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
65 70 75 80

Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
85 90 95

Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
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Thr Thr Ala
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<400> 52

24

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Ile Leu Gly Val Leu
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<220>
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Cys Gly His Gly His Ser Tyr Thr Thr Ala Glu Glu Ala Ala Gly Ile
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Gly Ile Leu Thr Val
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<210> 59

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Val Leu

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<223> MelanA 26-35-C

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<223> N terminal glycine serine linkers

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<222> (1)..(1)

<223> Glycine can be repeated from zero to five times

<220>

<221> REPEAT

<222> (3)..(3)

<223> Glycine can be repeated from zero to ten times

<220>

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<222> (4)..(4)

<223> Serine can be repeated from zero to two times

<220>

<221> REPEAT

<222> (5)..(9)

<223> These residues can be repeated from zero to three times as a group

<400> 62

Gly Cys Gly Ser Gly Gly Gly Gly Ser
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<210> 63

<211> 10

<212> PRT

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<223> c terminal glycine serine linkers

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<222> (1)..(1)

<223> Glycine can be repeated from zero to ten times

<220>

<221> REPEAT

<222> (2)..(2)

<223> Serine can be repeated from zero to two times

<220>

<221> REPEAT

<222> (3)..(7)

<223> These residues can be repeated from zero to three times as a group

<220>

<221> REPEAT

<222> (8)..(8)

<223> Glycine can be repeated from zero to eight times

<220>

<221> REPEAT

<222> (10)..(10)

<223> Glycine can be repeated from zero to five times

<400> 63

Gly Ser Gly Gly Gly Gly Ser Gly Cys Gly
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<210> 64

<211> 5

27

<212> PRT
 <213> Artificial Sequence

<220>
 <223> Glycine serine linker

<400> 64

Gly Gly Gly Gly Ser
 1 5

<210> 65
 <211> 10
 <212> PRT
 <213> Artificial Sequence

<220>
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<400> 65

Cys Gly Asp Lys Thr His Thr Ser Pro Pro
 1 5 10

<210> 66
 <211> 10
 <212> PRT
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<220>
 <223> C-terminal gamma 1

<400> 66

Asp Lys Thr His Thr Ser Pro Pro Cys Gly
 1 5 10

<210> 67
 <211> 17
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> N-terminal gamma 3

<400> 67

Cys Gly Gly Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala
 1 5 10 15

Pro

<210> 68
 <211> 18
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal gamma 3

<400> 68

Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala Pro Gly Gly
 1 5 10 15

Cys Gly

28

<210> 69
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal glycine linker

<400> 69
Gly Cys Gly Gly Gly Gly
1 5

<210> 70
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<212> PRT
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<220>
<223> C-terminal glycine linker

<400> 70
Gly Gly Gly Gly Cys Gly
1 5

<210> 71
<211> 6
<212> PRT
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<220>
<223> C-terminal glycine-lysine linker

<400> 71
Gly Gly Lys Lys Gly Cys
1 5

<210> 72
<211> 6
<212> PRT
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<220>
<223> N-terminal glycine-lysine linker

<400> 72
Cys Gly Lys Lys Gly Gly
1 5

<210> 73
<211> 6
<212> PRT
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<220>
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<400> 73
Cys Gly Lys Lys Gly Gly
1 5

<210> 74
<211> 6
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29

<223> N-terminal linker 2

<400> 74

Cys Gly Asp Glu Gly Gly
1 5

<210> 75

<211> 6

<212> PRT

<213> Artificial Sequence

<220>

<223> C-terminal liker

<400> 75

Gly Gly Lys Lys Gly Cys
1 5

<210> 76

<211> 6

<212> PRT

<213> Artificial Sequence

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<223> C-terminal linker 2

<400> 76

Gly Gly Glu Asp Gly Cys
1 5

<210> 77

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> C-terminal linker 3

<400> 77

Gly Gly Cys Gly
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<210> 78

<211> 10

<212> PRT

<213> Homo sapiens

<400> 78

Glu Ala Ala Gly Ile Gly Ile Leu Thr Val
1 5 10

<210> 79

<211> 9

<212> PRT

<213> Homo sapiens

<400> 79

Ala Ala Gly Ile Gly Ile Leu Thr Val
1 5

<210> 80

<211> 9

<212> PRT

<213> Homo sapiens

30

<400> 80

Lys Ala Val Tyr Asn Phe Ala Thr Met
1 5

<210> 81

<211> 12

<212> PRT

<213> Homo sapiens

<400> 81

Cys Gly Gly Lys Ala Val Tyr Asn Phe Ala Thr Met
1 5 10

<210> 82

<211> 12

<212> PRT

<213> Homo sapiens

<400> 82

Lys Ala Val Tyr Asn Phe Ala Thr Met Gly Gly Cys
1 5 10

<210> 83

<211> 18

<212> PRT

<213> Homo sapiens

<400> 83

Cys Gly Gly Gly Ser Glu Glu Ile Arg Ser Leu Tyr Asn Thr Val Ala
1 5 10 15

Thr Leu

<210> 84

<211> 9

<212> PRT

<213> Homo sapiens

<400> 84

Leu Ala Gly Ile Gly Ile Leu Thr Val
1 5

<210> 85

<211> 9

<212> PRT

<213> Homo sapiens

<400> 85

Met Ala Gly Ile Gly Ile Leu Thr Val
1 5

<210> 86

<211> 10

<212> PRT

<213> Homo sapiens

<400> 86

Glu Ala Met Gly Ile Gly Ile Leu Thr Val
1 5 10

31

<210> 87
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<400> 87

Glu Met Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 88
 <211> 10
 <212> PRT
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<400> 88

Tyr Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 89
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 89

Phe Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 90
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 90

Leu Pro Tyr Leu Gly Trp Leu Val Phe
 1 5

<210> 91
 <211> 118
 <212> PRT
 <213> homo sapiens

<400> 91

Met Pro Arg Glu Asp Ala His Phe Ile Tyr Gly Tyr Pro Lys Lys Gly
 1 5 10 15

His Gly His Ser Tyr Thr Thr Ala Glu Glu Ala Ala Gly Ile Gly Ile
 20 25 30

Leu Thr Val Ile Leu Gly Val Leu Leu Leu Ile Gly Cys Trp Tyr Cys
 35 40 45

Arg Arg Arg Asn Gly Tyr Arg Ala Leu Met Asp Lys Ser Leu His Val
 50 55 60

Gly Thr Gln Cys Ala Leu Thr Arg Arg Cys Pro Gln Glu Gly Phe Asp
 65 70 75 80

His Arg Asp Ser Lys Val Ser Leu Gln Glu Lys Asn Cys Glu Pro Val
 85 90 95

Val Pro Asn Ala Pro Pro Ala Tyr Glu Lys Leu Ser Ala Glu Gln Ser
 100 105 110 32

Pro Pro Pro Tyr Ser Pro
 115

<210> 92
 <211> 16
 <212> PRT
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<220>
 <223> CSPKSL-Melana 26-35 A/L

<400> 92

Cys Ser Pro Lys Ser Leu Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10 15

<210> 93
 <211> 18
 <212> PRT
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<220>
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<400> 93

Glu Leu Ala Gly Ile Gly Ile Leu Thr Val Ile Leu Gly Val Leu Gly
 1 5 10 15

Gly Cys

<210> 94
 <211> 118
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Melana 1-118 A/L

<400> 94

Met Pro Arg Glu Asp Ala His Phe Ile Tyr Gly Tyr Pro Lys Lys Gly
 1 5 10 15

His Gly His Ser Tyr Thr Thr Ala Glu Glu Leu Ala Gly Ile Gly Ile
 20 25 30

Leu Thr Val Ile Leu Gly Val Leu Leu Leu Ile Gly Cys Trp Tyr Cys
 35 40 45

Arg Arg Arg Asn Gly Tyr Arg Ala Leu Met Asp Lys Ser Leu His Val
 50 55 60

Gly Thr Gln Cys Ala Leu Thr Arg Arg Cys Pro Gln Glu Gly Phe Asp
 65 70 75 80

His Arg Asp Ser Lys Val Ser Leu Gln Glu Lys Asn Cys Glu Pro Val
 85 90 95

Val Pro Asn Ala Pro Pro Ala Tyr Glu Lys Leu Ser Ala Glu Gln Ser
 100 105 110

Pro Pro Pro Tyr Ser Pro
115